





FY05 Flight Demonstrations

June 3, 2004

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- Purpose
- Project organization
- Background
- Goals and objectives
- Milestones and exit criteria
- Flight experiments
- Schedule
- Status

June 15, 2004

Introduction



- Provide an overview of WxAP FY05 dedicated research flight experiments
- WxAP flight experiments will be accomplished through CRA with industry and dedicated research aircraft
- Dedicated research flight experiments will be accomplished with general aviation and transport type aircraft
 - General aviation Langley Cessna 206
 - Transport Aircraft Langley B757 and Glenn Lear 25

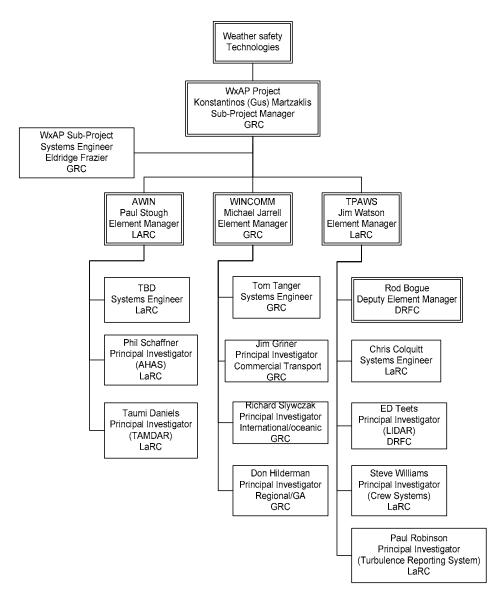
Project Organization



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Weather Accident Prevention







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- Each project element has independent experiment objectives while supporting the overall WxAP objective of evaluating and demonstrating integrated concepts to address weather hazards
- To date the WxAP project has conducted and completed three transport flight series
 - The B-757 ARIES supported the TPAWS and AWIN elements experiments from October though December 2000
 - Flight tests were conducted in conjunction with the synthetic vision deployment to Colorado Springs supported the TPAWS in situ algorithms experiment during August/September 2001
 - B-757 ARIES flight tests were conducted March through May 2002 included experiments from all three WxAP elements
- WxAP FY03 flight experiments scheduled, but not accomplished included:
 - TPAWS element turbulence AutoPIREP system (TAPS)
 - AWIN element aviation hazard awareness system (AHAS)
- The WxAP FY05 (scheduled) integrated flight tests will be fullyintegrated weather products demonstration
 - Transport
 - General aviation

Goals and Objectives



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Goal

Develop enabling technologies to reduce weather-related accident causal factors by 50% and turbulence-related injuries by 50% by the year 2007.

Objectives

Provide the Flight Deck with Higher Fidelity, More Timely Intuitive Graphical Information

Detect & Mitigate Weather Hazards

Challenges

Weather-related Threat Characterization Multi-purpose Sensor Systems and Displays Real-time Datalink
Communication

Approach

Use Aircraft and Satellites as Wx Data Collectors

Develop Weather
Products, Displays
and Decision Tools for
Cockpit Use

Revolutionize
Aircraft/Ground, and
Aircraft/Aircraft
Information Exchange

Elements

Aviation Weather Information (AWIN)

Turbulence Prediction & Warning Systems (TPAWS)

Weather Information Communications (WINCOMM)

Milestones and Exit Criteria



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#	WxAP L2 Milestones	Exit Criteria	TRL/IRL	QTR/FY	Level 1 Roll-up
2.4/12	Evaluation of Next- Generation Cockpit weather Information, Communications, Airborne Weather Reporting, and Turbulence Prediction and Warning Technologies: Evaluation and selected flight validation of next generation cockpit weather information, communications, airborne weather reporting, and turbulence prediction and warning technologies.	Final report(s) of development activities for next-generation cockpit weather information, communications, airborne weather reporting and turbulence prediction and warning technologies; and, post-flight report describing successful demonstration of the following systems: 1) Ground-to-air dissemination of weather products, including turbulence forecast product, to Transport aircraft cockpit weather information system, resulting in a pilot decision process, utilizing next-generation technologies applicable to a national and international environment. 2) Ground-to-air dissemination of weather products to GA aircraft cockpit weather information system, resulting in a pilot decision process, utilizing next-generation technologies in a relevant flight environment.	5/1	JUN/05	#5 (JUN/05)
		Air-to-ground dissemination of atmospheric data collected by airborne weather reporting sensor system, in an acceptable data format.			

Milestones and Exit Criteria (Cont'd)



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#	WxAP L2 Milestones	Exit Criteria	TRL/IRL	QTR/FY	Level 1 Roll-up
2.4/12	Evaluation of Next- Generation Cockpit weather Information, Communications, Airborne Weather Reporting, and	4) Air-to-air dissemination of turbulence encounter hazard data from one Transport aircraft to another (or suitable surrogate), resulting in display of transmitted turbulence hazard information in receiving aircraft cockpit.	5/1	JUN/05	#5 (JUN/05)
	Turbulence Prediction and Warning Technologies:	5) Air-to-ground dissemination of turbulence encounter hazard data from Transport aircraft to representative aviation ground collection system, in an acceptable data format.			
	Evaluation and selected flight validation of next generation cockpit weather information, communications, airborne weather reporting, and turbulence prediction and warning technologies.	6) Preliminary flight evaluation(s) of Radar and LIDAR turbulence warning systems, with appropriate hazard metrics and real-time hazard display for Radar, in appropriate convective and clear-air atmospheric conditions. Potential concepts defined of integrated radar and LIDAR (and other) comprehensive turbulence warning system.			

Integrated Transport Flight

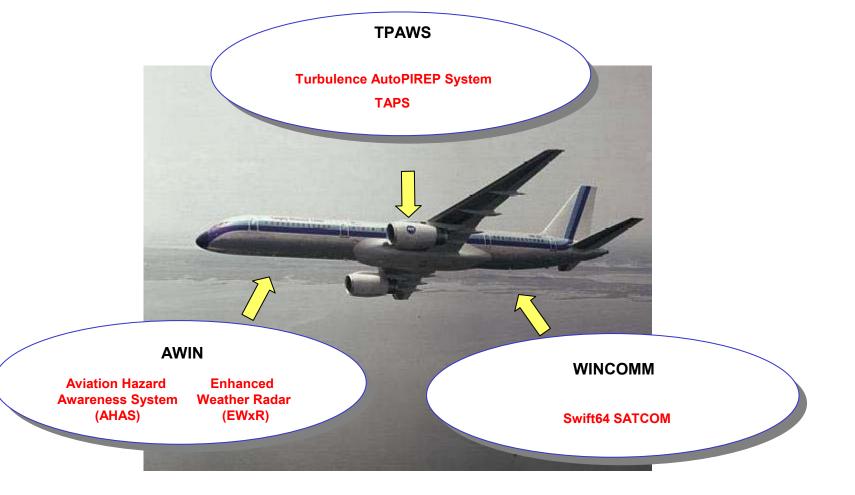


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 The FY2005 WxAP transport integrated flight experiment tests will support multiple experiments for the AWIN and TPAWS elements. The WINCOMM element will provide communication support for the AWIN and TPAWS experiments



Integrated Transport Flight



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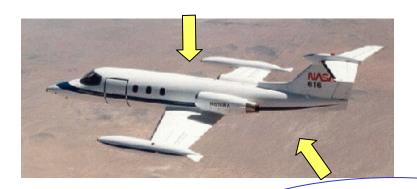


 The FY2005 WxAP Transport Integrated Flight Experiment, flights tests will support experiments for the TPAWS elements. The WINCOMM element will provide communication support for the TPAWS experiment

TPAWS

Turbulence AutoPIREP System

TAPS



WINCOMM

SATCOM

Integrated GA Experiment

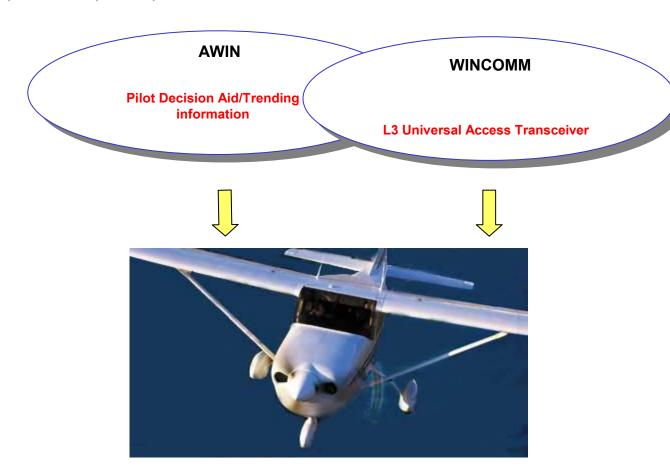


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 The FY2005 WxAP General Aviation Integrated Flight Experiment, flights tests will support multiple experiments for the AWIN and WINCOMM elements.



FY05 Level II Exit Criterion 1

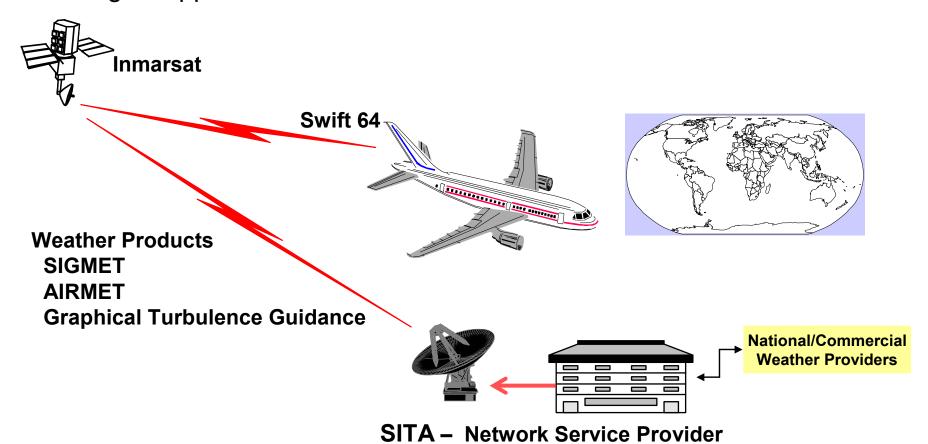


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Ground-to-air dissemination of weather products, including Turbulence Forecast Product, to Transport Aircraft Cockpit Weather Information System, resulting In a pilot decision process, utilizing next-generation technologies applicable to a national and international environment

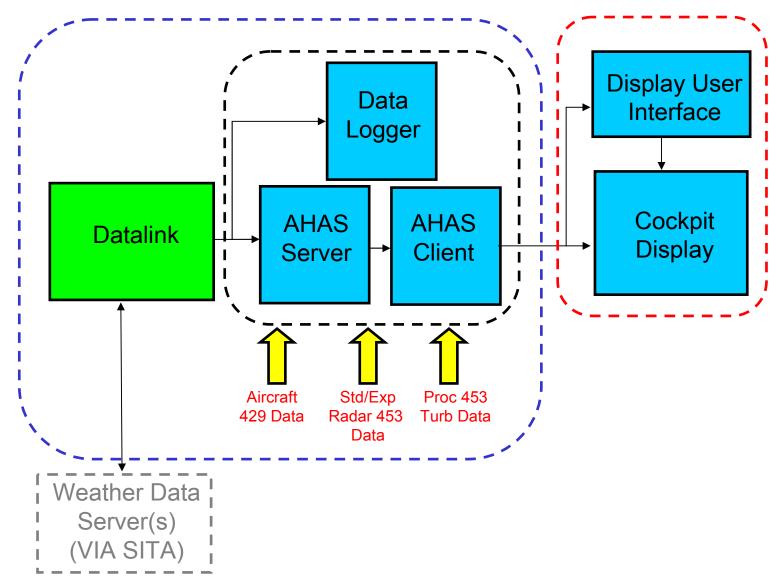




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FY05 Level II Exit Criterion 2

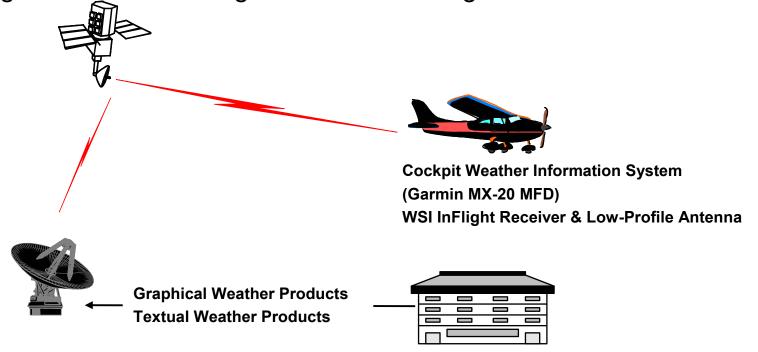


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Ground-to-air dissemination of weather products to GA aircraft cockpit weather information system, resulting in a pilot decision process, utilizing next-generation technologies in a relevant flight environment.



WSI InFlight Ground Station/Control Facility





Cockpit of NASA Cessna 206

FY05 Level II Exit Criterion 4

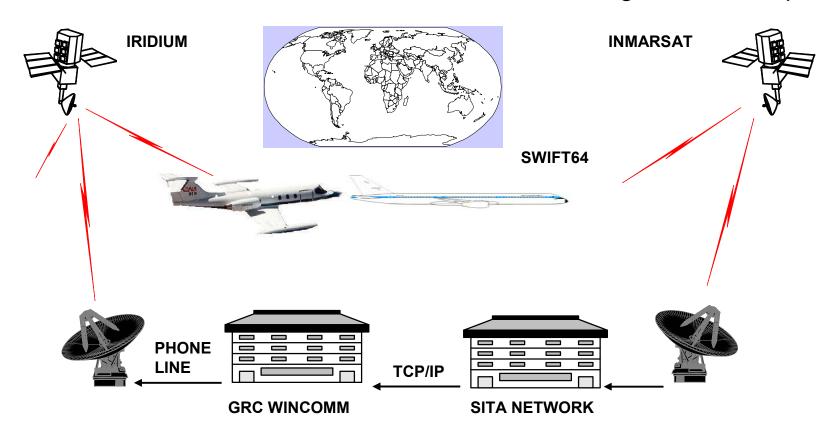


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Air-to-air dissemination of turbulence encounter hazard data from one Transport aircraft to another (or suitable surrogate), resulting in display of transmitted turbulence hazard information in receiving aircraft cockpit.

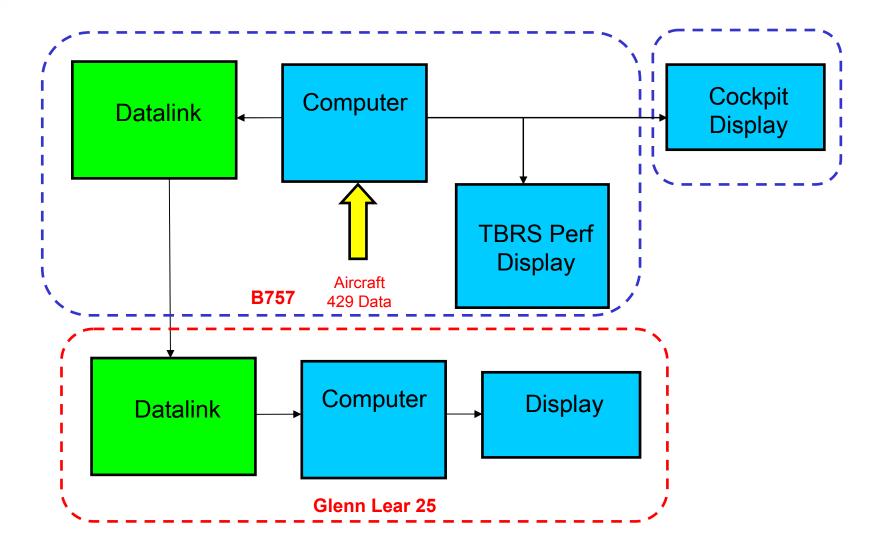




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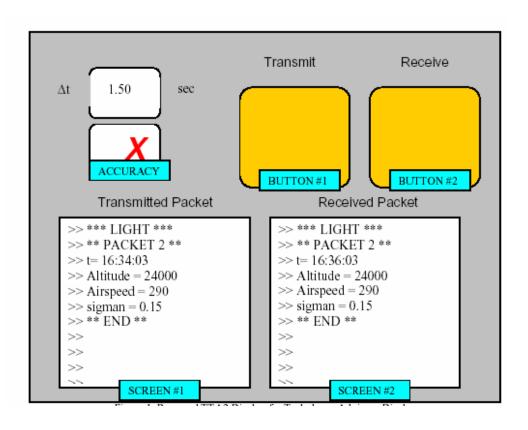




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Conceptual Display For TBRS

Schedule



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Final Hardware Systems Requirement Document

♦ Initial

July

Aug

Final Test Plan(s)

◊ - L2 Deliverable

FOTSR to

Feb

Jan

FOTSR Development

Hazard Analysis

Dec

Test Plans ASO/ASRB

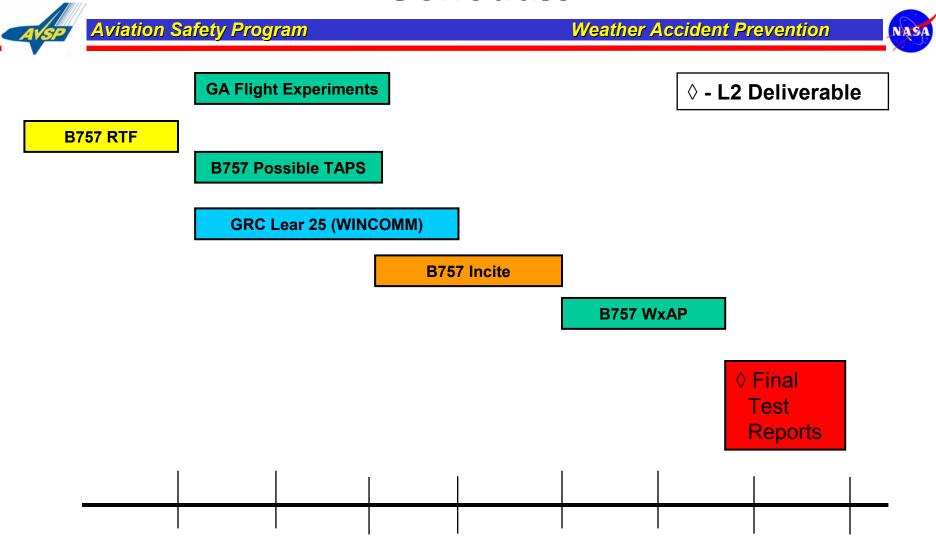
Nov

2004-2005

Oct

Sept

Schedule



2005

June

July

Aug

Sept

Oct

Mar

Apr

May



- •Finalize requirements and test plans.
- Aggressively work an optimistic schedule.

Status

- Communicate with stakeholders.
- Await B757 RTF.

"When once you have tasted flight, you will forever walk the earth with your eyes turned skyward, for there you have been, and there you will forever long to return." Attributed to Henry Van Dyke (10 November 1852 – 10 April 1933)





Backup Slides

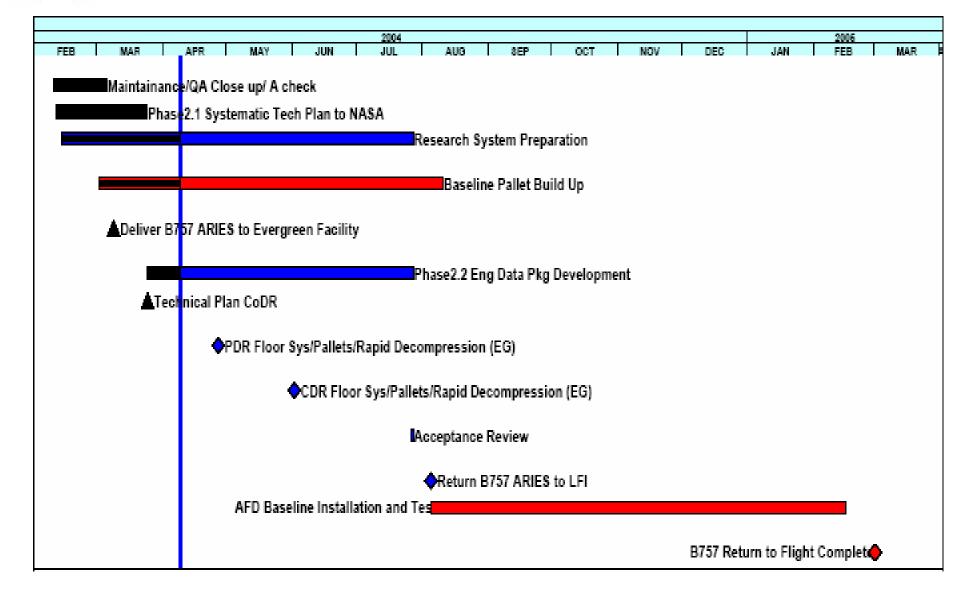
B757 RTF Top Level Schedule with AFD Baseline



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B757 RTF Schedule



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		2004							2005					
Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
Po	ssible Se	nsor Eva	luation (Eg	lin)										
В	Baseline T	RS Insta	llation and	Testing										
			OR											
		Bas	eline TRS	Installatio	n with AF	D								
							Possik	ole TAPS	APS		W	WxAP(TAPS/AWIN)		
							C-17	DUS&T	Ir	SITE				
+														
			- Ev	vorgroop.	AFD Analy	roio	Mods							
			LV	eigieeii z	AI D Allaly	313	WOUS							
								Possible AFD Installation						

Proposed Cabin Layout for AFD Baseline w/InSITE



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